

**What is claimed is:**

1. An integrated microarray device, which device comprises a substrate comprising a plurality of distinct microlocations and a plurality of microarray chips, wherein the  
5 number of said microlocations equals to or is more than the number of said microarray chips.
2. The device of claim 1, wherein the substrate comprises silicon, plastic, glass, ceramic, rubber, polymer or a composite thereof.
- 10 3. The device of claim 2, wherein the silicon is silicon dioxide or silicon nitride.
4. The device of claim 1, wherein the substrate comprises a surface that is hydrophobic or hydrophilic.
- 15 5. The device of claim 1, wherein the substrate comprises a surface that is porous or nonporous.
6. The device of claim 1, wherein the microlocations and/or the microarray chips  
20 are fabricated on the substrate.
7. The device of claim 1, which comprises  $(12)_n$  number of microlocations, wherein n is an integer that is at least 1.
- 25 8. The device of claim 1, wherein the microlocations are evenly or unevenly distributed on the substrate.
9. The device of claim 1, wherein the number microlocations and the distance among the microlocations correspond to a standard microtiter plate.
- 30 10. The device of claim 1, wherein the microlocations are in a well format or a

thermally insulated flat surface format.

11. The device of claim 10, which comprises  $(12)_n$  number of wells, wherein n is an integer that is at least 1.

12. The device of claim 10, which comprises 96, 384 or 1,536 wells.

13. The device of claim 10, wherein the wells have a geometry selected from the group consisting of circle, oval, square, rectangle, triangle and other irregular shape(s).

14. The device of claim 10, wherein the wells have identical or different shapes.

15. The device of claim 1, wherein at least one of the microlocations is in fluid contact with a fluid source or fluid passage outside the device.

16. The device of claim 1, wherein all of the microlocations are in fluid contact with a fluid source or fluid passage outside the device.

17. The device of claim 1, wherein at least two of the microlocations are in fluid contact with each other.

18. The device of claim 1, wherein all of the microlocations are in fluid contact with each other.

19. The device of claim 1, wherein at least one of the microlocations is thermally insulated.

20. The device of claim 1, wherein all of the microlocations are thermally insulated.

21. The device of claim 10, wherein at least one of the wells is thermally insulated.

22. The device of claim 10, wherein all of the wells are thermally insulated.

23. The device of claim 19, wherein the microlocation(s) is thermally insulated by inert gas.

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24. The device of claim 23, wherein the inert gas is air.

25. The device of claim 22, wherein all of the wells are connected to each other by thin girders and thermally insulated by the air contained between the walls of the adjacent wells.

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26. The device of claim 1, wherein each of the microlocations comprises a microarray chip.

27. The device of claim 1, wherein the microarray chips have identical or different densities.

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28. The device of claim 1, wherein the microarray chips have a density of  $(100)_n$  spots/cm<sup>2</sup>, wherein n is an integer that is at least 1.

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29. The device of claim 1, wherein at least one of the microarray chips has a density that is less than or equals to 400 spots/cm<sup>2</sup>.

30. The device of claim 1, wherein all of the microarray chips have a density that is less than or equals to 400 spots/cm<sup>2</sup>.

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31. The device of claim 1, wherein at least one of the microarray chips has attached thereto a plurality of moieties.

32. The device of claim 31, wherein the microarray chip(s) has attached thereto a plurality of moieties on facing up or down direction.

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33. The device of claim 31, wherein each of the moieties is selected from the group consisting of a cell, a cellular organelle, a virus, a molecule and an aggregate or complex thereof.

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34. The device of claim 33, wherein the cell is selected from the group consisting of an animal cell, a plant cell, a fungus cell, a bacterium cell, a recombinant cell and a cultured cell.

10 35. The device of claim 33, wherein the cellular organelle is selected from the group consisting of a nuclei, a mitochondrion, a chloroplast, a ribosome, an ER, a Golgi apparatus, a lysosome, a proteasome, a secretory vesicle, a vacuole and a microsome.

15 36. The device of claim 33, wherein the molecule is selected from the group consisting of an inorganic molecule, an organic molecule and a complex thereof.

20 37. The device of claim 36, wherein the inorganic molecule is an ion selected from the group consisting of a sodium, a potassium, a magnesium, a calcium, a chlorine, an iron, a copper, a zinc, a manganese, a cobalt, an iodine, a molybdenum, a vanadium, a nickel, a chromium, a fluorine, a silicon, a tin, a boron and an arsenic ion.

25 38. The device of claim 36, wherein the organic molecule is selected from the group consisting of an amino acid, a peptide, a protein, a nucleoside, a nucleotide, an oligonucleotide, a nucleic acid, a vitamin, a monosaccharide, an oligosaccharide, a carbohydrate, a lipid and a complex thereof.

39. The device of claim 1, wherein at least two of the microarray chips have attached thereto a plurality of moieties.

30 40. The device of claim 39, wherein each of the microarray chips has attached thereto same type or different type of moieties.

41. The device of claim 1, wherein each of the microarray chips has attached thereto a plurality of moieties.

5        42. The device of claim 1, wherein at least one of the microlocations comprises a temperature controller.

43. The device of claim 42, wherein each of the microlocations comprises a temperature controller.

10       44. The device of claim 42, wherein each of the temperature controller is individually controllable.

15       45. The device of claim 42, wherein the temperature controller is selected from the group consisting of a resistive heater, a bidirectional semiconductor temperature controller, a ceramic heater and an infrared heater.

46. The device of claim 1, wherein the substrate is an unitary unit.

20       47. The device of claim 1, wherein the substrate is an assembled unit, which can be disassembled into at least two parts.

48. A method for detecting interaction between a test moiety and a plurality of target moieties, which method comprises:

25       a) providing an integrated microarray device, which device comprises a substrate comprising a plurality of distinct microlocations and a plurality of microarray chips, wherein the number of said microlocations equals to or is more than the number of said microarray chips, and a plurality of target moieties attached to said microarray chips;

b) contacting a test moiety with said plurality of target moieties provided in step a);

30       and

c) detecting interaction between said test moiety and said plurality of target

moieties.

49. The device of claim 48, wherein the integrated microarray device comprises a substrate comprising a plurality of distinct microlocations and each of the microlocations  
5 comprises a microarray chip and a temperature controller.

50. The device of claim 48, wherein the interaction being detected are interaction(s) among moieties selected from the group consisting of a cell, a cellular organelle, a virus, a molecule and an aggregate or complex thereof.  
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51. The device of claim 48, wherein the plurality of target moieties is a plurality of genes, gene fragments or their encoded products.

52. The device of claim 51, wherein the plurality of genes, gene fragments or their  
15 encoded products are involved in a biological pathway, belong to a group of proteins with identical or similar biological function, expressed in a stage of cell cycle, expressed in a cell type, expressed in a tissue type, expressed in an organ type, expressed in a developmental stage, proteins whose expression and/or activity is altered in a disease or disorder type or stage, or proteins whose expression and/or activity is altered by drug or  
20 other treatments.

53. The device of claim 48, wherein interaction between a plurality of target moieties and a plurality of target moieties are detected.

25 54. The device of claim 48, wherein interaction between a plurality of target moieties and a plurality of target moieties are detected simultaneously or sequentially.